

# Information Bulletin

## Inadequate Mitigation of Outdoor Alpha Contamination Lead to Increased Airborne Radioactivity Levels

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**Summary:** Contamination modeling and hazard controls should be evaluated to ensure hazards are adequately addressed under all conditions. Additionally, personnel need to be cognizant of conditions that place them outside of normal, routine evolutions or procedures and immediately stop work to notify management when these conditions arise.

**Discussion of Activities:** Personnel retrieving a waste drum in a High Contamination Area (HCA)/Airborne Radiation Area (ARA) encountered alpha contamination when the drum was tilted to perform a radiological survey beneath the drum. A technical smear indicated 360,000 dpm per 100cm<sup>2</sup> alpha contamination on the soil beneath the drum. There was no evidence of damage on the drum or spilled material.

Two banks of overhead misters are usually employed to control airborne alpha contamination. Because one bank of misters was not operational, a hand-held fogger was used to mitigate the potential for resuspension and spread of contamination. The hand-held fogger did not provide equivalent mitigation of the contamination hazard. The workers surveyed out of the HCA/ARA with no contamination found on skin or personal clothing. After personnel exited the area, the record air sampler results were evaluated. All of the air samples in the HCA indicated >1 Derived Air Concentration (DAC). Two samplers in the Radiological Buffer Area (RBA) indicated >10 percent of a DAC. Lapel air sample results for two of the workers inside the HCA and three of the workers in the RBA indicated potential exposure to airborne contamination >1 DAC-hour. Final dose assessments resulted in a collective dose to these workers of 4 person-mrem.

**Analysis:** Unusual summer atmospheric conditions of stagnant air created a previously unencountered condition. While stagnant air conditions often occur in the fall, past operations have experienced a higher moisture content which assisted in mitigating alpha contamination. The stagnant condition of the air, coupled with the dry weather, allowed the contamination to re-suspend.

During this event, only one of two banks of overhead misters was operational. Based on recent experience at similar projects, a hand-held fogger was identified as the appropriate tool to compensate for one bank of overhead misters being out of service. This was the first time the hand-held foggers had been used in dry, low humidity conditions. Work documents did not contain criteria for when the hand-held foggers can be used effectively.

The nature of the retrieval process creates a high potential for encountering unknowns, which in

turn causes a reliance on individual decision making processes (knowledge based). Additionally, outdoor alpha mitigation is a non-routine practice where limited information is available on which to base procedural requirements. Additional documented criteria reduce the reliance on knowledge based reactions and mitigate the potential for human error.

**Recommended Actions:**

- Perform outdoor contamination modeling based on stagnant air conditions. Based on the results, develop additional controls, such as PPE removal, decontamination, techniques, and survey requirements from HCA/ARA when contamination is found on PPE.
- Perform a hazards analysis for all activities in sufficient depth to ensure response actions and protective measures are identified and documented in the appropriate work documents.

**Cost Savings/Avoidance:** Not Evaluated

**Work Function:** Radiation Protection

**Hazards:** Personnel Exposure - Airborne Hazards

**ISM Core Functions:** Analyze Hazards, Develop/Implement Controls

**Keywords:** Alpha Contamination, Airborne Radioactive Material

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**References:** Radiological Problem Report SW-07-011